ABSTRACT

The invention features a method including: (i) providing an interference signal $S(t)$ from two beams derived from a common source and directed along different paths, wherein the signal $S(t)$ is indicative of changes in an optical path difference $n\tilde{L}(t)$ between the different paths, where n is an average refractive index along the different paths, $\tilde{L}(t)$ is a total physical path difference between the different paths, and t is time; (ii) providing coefficients representative of one or more errors that cause the signal $S(t)$ to deviate from an ideal expression of the form $A_1\cos(\omega_R t+\varphi(t)+\zeta_1)$, where A_1 and ζ_1 are constants, ω_R is an angular frequency difference between the two beams, and $\varphi(t)=nk\tilde{L}(t)$, with $k=2\pi/\lambda$ and λ equal to a wavelength for the beams; (iii) calculating a quadrature signal $\tilde{S}(t)$ based on the signal $S(t)$; and (iv) reducing the deviation of $S(t)$ from the ideal expression using an error signal $S_\psi(t)$ generated from the coefficients and error basis functions derived from the signals $S(t)$ and $\tilde{S}(t)$.